



# **Strategy for the Development of an Airshed Management Program for the Treasure Valley**

## **acknowledgements**

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## **purpose**

The goal of airshed management is to prevent deterioration of air quality through proactive planning to ensure protection of public health.

This document provides an overview of the Idaho Department of Environmental Quality's (DEQ) Airshed Management initiative for managing air pollution. It is not intended to be a comprehensive review of local air pollution issues and studies, nor is it intended to definitively describe all components of a fully developed Airshed Management program. Rather, it is intended to explain the basic tenets of airshed management, describe the reasons why DEQ believes the Airshed Management approach is necessary in the Treasure Valley, and provide a framework for the development of a comprehensive Airshed Management Program. It includes a five-year schedule for developing a document to fully detail the Treasure Valley Airshed Management Program.

The Treasure Valley Airshed Management Program will be adapted for application in other areas of Idaho, including Pocatello, the Rathdrum Prairie, and Lewiston.

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# Section 1

## introduction to airshed management



### what is an airshed?

An **airshed** is an area covered by a volume of air that has similar characteristics and is separated from other volumes of air by weather patterns or topography. Air pollution that is emitted in one area will spread out and become distributed across the airshed. For this reason, air pollution levels are generally similar across a given airshed.

The boundaries of an airshed can be difficult to determine due to changing conditions. Ridges and mountains prevent the circulation of air, and hold pollution within their boundaries. But weather conditions change on a daily basis, and features that obstruct the movement of air on some days may represent no barrier at all when a weather front pushes through.

Under normal circumstances, air near the ground heats up during the day. Hot air is lighter, causing it to rise. Cooler air rushes in to take its place near the ground. This constant circulation mixes polluted air with cleaner air, and helps flush out pollution. When air is calm or **stagnant**, pollution tends to stay near the same area that it is emitted, allowing concentrations to build up. Layers of different temperatures in the air can create a “lid” that holds pollution in. This “lid” is called the **mixing height**, or the elevation up to which pollutants

are mixed. Low mixing heights keep the air beneath stagnant, and pollutants trapped near the ground.

DEQ bases the boundaries of local airsheds on meteorological data from time periods when air is least able to mix, and air pollution levels are expected to be highest.



Figure 1. Diagram of inversion

## methods of air quality management

DEQ is working toward managing air quality consistently across an entire airshed, as opposed to methods used in the past, which were based on political boundaries. Idaho has traditionally focused on addressing air pollution problems through prescriptive means dictated by the Environmental Protection Agency (EPA).

As required by the federal Clean Air Act, areas that measure violations of the **National Ambient Air Quality Standards** are designated **nonattainment** for that pollutant. These areas are subject to more regulations and restrictions than areas with good air quality. Sanctions such as withholding federal highway dollars may be implemented in these areas. Under the requirements of the federal Clean Air Act, the State is responsible for developing an Air Quality Improvement Plan that explains how the problem will be corrected. The Plan must be submitted to the EPA for approval. Once approved, the document and its requirements become federally enforceable. Developing this type of reactive Plan is expensive, and the solutions may be burdensome. If a State fails to prepare a Plan, the federal government will step in to develop the clean-up plan for the area. The traditional type of management has resulted in dramatic reductions in pollution concentrations in problem areas. However, managing air pollution based on political boundaries and in response to existing problems is not the most efficient means of ensuring healthy air quality.

The science of air pollution points to managing air quality on an airshed basis, rather than targeting specific counties. Of course, air pollution does not stop at county or state lines. Pollution created in one area may travel many miles, affecting the air quality of other areas. When adjacent areas all have sources that contribute to air pollution levels, it is inequitable to place all of the burden for controlling that air pollution on the residents and businesses of one community. Managing air pollution sources only within nonattainment areas can not solve an airshed-wide problem.

Idaho DEQ has redirected its focus toward managing air pollution consistently and proactively across an entire airshed. This approach is called **Airshed Management**. The primary goal is to ensure protection of public health. Airshed Management is based on involving the community in developing community visions and goals for air quality; collecting and evaluating scientific information; developing voluntary, locally directed strategies to protect public health and reach community goals; and de-politicizing the implementation of air quality protection strategies. Its goal is to plan for good air quality on a longer horizon than traditional

approaches, looking out 20 to 25 years. It also addresses all pollutants of concern in an area holistically, rather than addressing each separately, which can be inefficient and counter-productive. The approach relies on communities, the public, and businesses making choices that will help prevent future problems.

The Airshed Management approach is a voluntary effort, and is designed to avoid future problems in air pollution and to meet the communities' wishes for air quality. DEQ will incorporate all Clean Air Act requirements into the Airshed Management approach. However, if violations of the national health-based air quality standards are measured at any time, DEQ must resolve the public health threat under the regulatory framework of the federal Clean Air Act. This will involve reverting to traditional pollution control strategies.

## airshed management: moving from *fixing* to *preventing*

Managing air pollution proactively can help us avoid the pitfalls of traditional air pollution management. Once a problem has developed, it may take years to resolve, subjecting the public to unacceptably high pollution levels and health risks. In addition, waiting until a problem develops can result in the need for expensive "retro-fit" solutions. Developing an Air Quality Improvement Plan in response to a nonattainment designation is costly because extensive data collection, modeling, and documentation must be accomplished in a short period of time. Control strategies become part of a federally enforceable document, resulting in less flexibility and less local control. Stringent permit regulations apply in a nonattainment area, which may affect production costs and discourage new or expanding businesses. Other negative effects of increased air pollution include reduced crop yield, damage to the environment, and damage to the scenic image of an area. Managing air pollution proactively across the entire airshed can reduce or eliminate these problems, as well as ensure that the burden of planning and protecting air quality is shared among all contributors to local air quality.

There are concerns with applying an Airshed Management approach. For example, to be successful, the Airshed Management approach will require that all pollution sources work together to achieve the community's objective of clean air. DEQ may need additional authority to regulate some sources of air pollution that are not currently regulated under the Idaho Rules or the Clean Air Act. Examples of these types of sources include agriculture and older, **grandfathered** industrial sources. As some of these

sources have not been asked to participate in air quality protection previously, there may be resistance or concern. Also, managing pollution from numerous small, individual sources, such as motor vehicles, can be a challenge. While emissions tests are effective in reducing excessive emitters, constant increases in the sheer number of vehicles can overwhelm this benefit. Developing and improving functional and convenient transportation alternatives to alleviate this problem could be difficult.

## elements of airshed management

Airshed Management has two basic components. One is a commitment to collect accurate data and develop good scientific understanding of the air pollution dynamics in each airshed. This will ensure that any proposed strategies to manage pollution will be effective. The other is to engage the community, residents, and businesses of the airshed in decisions about the best course for protecting air quality. The communities in an airshed will be involved in establishing an air quality vision and goals for their area.

Based on these two components, science and community involvement, strategies to protect air quality will be developed. These may include community-based strategies such as local ordinances or programs, or strategies that DEQ will oversee through regulations or policies.

It is essential that strategies designed to protect air quality be applied consistently and fairly across the entire airshed. This will help to de-politicize implementation of control strategies. DEQ will work to ensure that its policies and regulations are consistent across each airshed, and will encourage adoption of uniform community strategies across the valley.

DEQ will provide regular communication on the progress toward realizing the community air quality goals through its airshed advisory groups, regular public meetings, and outreach campaigns targeting elected officials, businesses, and the general public.

## legal authorities

DEQ is required by the Idaho Environmental Protection and Health Act (EPHA) to supervise and administer a system to safeguard air quality in the State of Idaho.<sup>1</sup> DEQ's Board of Directors may formulate and adopt rules, regulations, codes and standards deemed necessary to deal with problems related to air pollution.<sup>2</sup> With the exception of nonattainment areas, neither the EPHA nor the Rules for the Control of Air Pollution in Idaho dictate how specific area air quality issues should be managed. Rather, the law gives DEQ broad authority to administer a system to safeguard air quality. It may be determined while developing the Treasure Valley Airshed Management Plan that certain items should be adopted in the Rules. If so, DEQ will undergo rulemaking procedures.<sup>3</sup>



Figure 2. Relationship among the main elements of Airshed Management.



# Section 2

## the treasure valley airshed



The Treasure Valley is situated in southwest Idaho in a shallow geological basin in the Snake River Plain. A series of river benches and mountain ranges create a barrier to air flow in and out of this basin. All of Ada and Canyon Counties are contained within this valley, as well as portions of other counties. The Treasure Valley is the largest and most populated urban area in Idaho, containing about one-third of the State's population.

Ada County was designated as a nonattainment area for particulate matter and carbon monoxide years ago. While violations of air quality standards have not been measured in Canyon County since monitoring began, rapid growth is occurring in this area. Air quality monitoring and meteorological data indicate that the entire Treasure Valley shares a single airshed. Particulate matter pollution levels are often consistent across the valley. Carbon monoxide levels also fluctuate uniformly.

Most of the time, the Treasure Valley airshed can absorb the pollution released into it. However, there

are times when the capacity of the airshed to disperse air pollution is significantly reduced. This occurs when the air in the Treasure Valley basin becomes **stagnant** and resistant to mixing with air from other areas.

Temperature inversions are common during the winter, particularly in late December and early January. An **inversion** occurs when heavy, cold air is trapped near the ground beneath warmer, lighter air. This condition suppresses the movement of air, allowing pollution to build up over several days. A severe inversion has not occurred in this area since 1991, when exceedances of air quality standards were last measured.

DEQ is concerned that, with a severe temperature inversion, a violation of the particulate matter air quality standards might occur. DEQ is also concerned about future air quality in the valley. As the area grows, emissions will increase. Increased pollution along with unfavorable weather conditions combine to create an airshed that needs careful protection.

Air pollution concerns facing the valley are complex. Some of the difficulty is due to numerous small

sources of pollution, especially motor vehicles. Adding to the complexity, some substances can chemically react in the air to create more hazardous **secondary pollutants**. These secondary pollutants, and the **precursors** that create them, can migrate over long distances and contribute to pollution problems across a wide area.

Ada and Canyon Counties share a single airshed and are part of a growing metropolitan area. As the separation between urban areas across the valley becomes less distinct, planning for the transportation and future growth is beginning to be done in conjunction. It is essential that air quality planning also focus on the entire region.

## boundaries of the treasure valley airshed

DEQ determines airshed boundaries by examining topographical barriers to air movement such as mountains or ridges, as well as local weather conditions that would affect pollution build-up.

In the Treasure Valley, the Boise Front, a mountain range roughly 1,800 meters high (*about 6,000 feet*), extends generally east-west, and creates a barrier to air flow on the northeastern edge of the valley. To the south a series of river benches, the Snake River, and the Owyhee Mountain Range all impact air flow. The path taken by the Snake River outlines the southern boundary of both Ada and Canyon Counties.

In the Treasure Valley, mixing heights are typically lowest and pollution levels are highest during the winter season. Using radar soundings and weather balloons to determine temperature differences in the layers of air, climatologists have documented that the average mixing height in the Treasure Valley area during winter months is 300 meters (*about 1,000 feet*) or less above the surface of the valley.<sup>4</sup>

Using an average valley elevation of 750 meters (*about 2,500 feet*) plus the mixing height of 300 meters, an elevation of 1,100 meters (*about 3,500 feet*) above sea level was determined to be the elevation of the Treasure Valley's local wintertime airshed barrier.

A line at 1,100 meters was overlaid across the topographical features of the valley and was used as the initial basis for describing the extent of the Treasure Valley airshed. This elevation line outlines an area that includes Ada and Canyon Counties, as well as portions of Oregon, and Owyhee, Elmore, Gem and Payette Counties, and portions of Oregon.

To facilitate development of the Airshed Management Program, DEQ evaluated some additional restrictions for the management area. We considered distance from the population centers and pollution sources, smaller ridge lines, and political boundaries where they corresponded closely to the 1,100 meter elevation line. This led us to exclude some areas from the initial definition.

- A slight elevation increase extends across the Ada/Elmore County boundary to the east. DEQ assumes that this slight rise, along with the distance between populated areas where pollutants may be emitted, prevents any significant exchange of air pollutants with Elmore County, particularly on stagnant days. To simplify the administration of air quality management strategies, the eastern boundary of the airshed will initially be placed along the Ada/Elmore County boundary.
- Sources in eastern Oregon may contribute to air pollution in the Treasure Valley. However, DEQ's ability to regulate those sources or involve Oregon communities in the Airshed Management Program is limited. Scientific data demonstrating a link between emissions in Oregon and air quality in the Treasure Valley have not been established. During development of the Treasure Valley Airshed Management Program, Idaho DEQ will approach the State of Oregon about forming a cooperative partnership to protect air quality in this region. We will also begin monitoring near the Oregon border to determine effects of pollutant transport from eastern Oregon. Initially, the western boundary of the airshed will be the Idaho-Oregon state line.
- Owyhee County is sparsely populated, with few emissions sources except from agricultural activities. Unless there are source-specific reasons, DEQ proposes that the southern edge of the airshed be located along the Snake River, which creates the southern border of Ada and Canyon Counties.
- A ridge line along the northern edge of Ada and Canyon Counties appears to present a barrier to air flow during the most stagnant conditions. However, DEQ plans to begin outreach and monitoring efforts in Gem and Payette Counties to determine how air pollution levels between these areas and the Treasure Valley are related. These Counties may elect to be included in the Treasure Valley Airshed during the Airshed Management Program development. For now, DEQ will establish the northern boundary of the airshed at the northern Ada and Canyon County borders.



Figure 3. Map of Treasure Valley Airshed

As we embark upon the Airshed Management approach, the initial definition of the Treasure Valley Airshed will be limited to Ada and Canyon Counties. This definition of the management area may be modified during the Program's development as additional data become available and outreach efforts are expanded.

